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AUTHOR Gregg, Noel; Hoy, Cheri
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ABSTRACT

Performance of 25 learning disabled (LD) and 25 normally achieving college students on the Torrance Test of Creative Thinking (Figural) was compared. Group mean scores were analyzed using a t-test. Group mean Figural Creativity Index Scores were significantly higher for the LD students than the normally achieving students. Subtest score analysis revealed that LD subjects scored significantly higher than the normals in elaboration, resistance to premature closure, and mean bonus points. No significant group differences were found on fluency, originality, and abstractness of title scores. Results indicated the need to include assessments of divergent thinking and creative problem solving in diagnostic assessments of LD college students. (CL)

# Learning Disabled College Students' Figural Problem Solving Skills

Noel Gregg, Ph.D.
Cheri Hoy, Ph.D.

University of Georgia

Running Head: Figural Problem Solving

ABSTRACT

This study compares the performance of learning disabled and non-learning disabled college students on the Torrance Test of Creative Thinking (Figural). This study found that the mean Figural Creativity Index Scores were significantly higher for the learning disabled college students. Application for assessment and intervention are discussed.

Educators working with learning disabled college students report that these individuals appear highly motivated and draw on strengths not usually assessed during typical educational assessments. Creative problem solving is an assessment area often neglected by many professionals responsible for the diagnostic testing of learning disabled college students.

Research investigating the problem solving strategies of learning disabled adolescents and/or adults has been limited in number and quality. Based on observational data, Wilcox (1970) discussed several factors which might account for a breakdown in the logical thinking of learning disabled adolescents. These factors included an inability to sustain attention, poor organization, difficulty in selecting, and deficient memory. In a discussion of the thinking processes of learning disabled college students, Cordoni (19880) noted rigidity of throught patterns as being characteristic. Such rigidity would negatively effect problem solving behavior. However, studies such as these often times are using definitions of problem solving which focus on convergent thinking. Most of the assessment instruments currently used to diagnose learning disabled college students stress convergent thinking. Perhaps the unassessed strengths noted by educators working with learning disabled college students could be uncovered by tasks requiring divergent thinking.

Support for a need to investigate the divergent problem solving skills of learning disabled individuals stems from the neuroanatomical studies of Galaburda and his associates (1983). Recent research on the neuroanatomy of dyslexics has found that anamalous lateralization and asymetry may be a characteristic of the brain of some dsylexics (Galaburda, 1983). Results suggest that there is the potential for right hemisphere substrates to develop more fully in the brains of the dyslexic than in the non-dyslexic populations. Galaburda reports that these results, ". . . could help explain the anecdotal evidence suggesting that among dyslexics there is a disproportionately large number of individuals with special talents in music, visuo-spatial abilities, and left handedness." (1983, p. 51).

Creativity as a cognitive process has been described in great detail by Torrance (1979). Creative abilities, creative skills, and creative motivation are seen as the foundation for creative problem solving in Torrance's model. As he states "A high level of creative achievement can be expected consistently only from those who have creative motivations (commitment) and the skills necessary to accompany the creative abilitiies" (1979, p. 12). Torrance also stresses that no creative thinking is likely to occur until there is a recognition of a problem, a definition of the problem, and a commitment to deal with the problem. These requirements of creative problem solving are

similar to the three processes Resnick (1976) cites as necessary for productive problem solving (i.e., problem detection, feature scanning, and goal analysis). Torrance's description of the creative problem solving process (1979) addressses Treffinger, Renzulli, and Feldhusen's (1975 criticism of Guilford's and Torrance's early work on creativity. Renzulli warned that while divergent thinking may be necessary in creative problem solving, it cannot be viewed as the total component. The interaction of Torrance's abilities, skills, and motivation components addresses the complexity of creative problem solving.

Researchers have indicated that many learning disabled students demonstrate considerable motivation to learn; however, the connection between their strong motivation and divergent problem solving has not been addressed in research. Therefore, it was the purpose of this study to investigate the figural divergent problem solving strategies of learning disabled college students as a means of providing further information regarding the learning strategies of such students. Figural problem solving was selected over verbal since the work of Galaburda and his associates (1983) have found that there is the potential for the right hemisphere substrates to develop more fully in the brains of the dyslexic population.

METHODOLOGY

Subjects:

Learning Disabled: Twenty-five learning disabled undergraduate students (15 male, 10 female) from a large southeaastern university participated in this study. Each of the students had been diagnosed learning disabled following a two-day psychoeducational assessment at the university's Learning Disabilities Adult Clinic. Each of these students had been admitted through the university's regular admissions procedures. All of the students were maintaining a grade point average (GPA) of at least a 2.0 on a 4.0 scale at the time of the study. Fourteen of the students attended the university's Learning Disabilities Adult Clinic twice a week for learning disabilities resource help.

Ten of the twenty-five students had been identified learning disabled in elementary and/or secondary school. The mean chronological age was 19.9. The mean scores on the Wechsleer Intelligence Scale for Adults-Revised (WAIS-R) included: Verbal Scale mean = 106 (range 84-143); Performance Scale mean = 105 (83-134); and Full Scale mean = 106 (range 87-143). Peabody Picture Vocabulary Test - Revised mean standard score for the group was 101 (range = 71-134).

Normal: Twenty-five normally achieving female undergraduates at the university participated as a control group.

Each of the students was a junior or senior majoring in elementary education. None of these subjects had received any special education services while attending elementary and/or secondary school. The average age of these students was 21.0. Each of these students had been admitted into the university under regular admissions procedures. All of the students were maintaining a grade point average of at least 2.8 and would be placed in student teaching positions the following quarter.

Controlling Group Differences: It was recognised that comparing a mixed male/female group to an all female group could add a confounding variable to the study. Therefore, mean index scores for the figural creativity were analyzed using a t-test to determine if there was a significant difference between the male and female lerning disabled subjects. No significant differences were found ($p < .01$).

TASKS:

The Torrance Test of Creative Think ig - Figurative (Torrance, 1966, 1974) was administered to the normal subjects in one group sitting. The test was individually administered to the learning disabled subjects during one sitting. Thinking Creatively with Pictures (Torrance, 1966, 1974) consists of three subtests requiring thirty minutes of student working time.

The three figural subtests were scored using the streamlined scoring procedures (Torrance & Ball, 1984). These scoring procedures result in five norm-referenced measures and thirteen criterion-referenced measures. The norm-referenced measures include: fluency, originality, abstractness of titles, elaboration, and resistance to premature closure. The raw scores for the norm-referenced measures were converted to standard scores. The figural creativity index score is the mean standard score of the five norm-referenced measures. The criterion-reference measures are scored on a checklist of creative strengths. A total score from the checklist of creative strengths is considered a bonus score added to the mean creativity index for a total figural creativity index score.

Several scoring reliability studies have been completed and indicate that it is possible to keep the scoring reliability above the .90 level (Torrance & Ball, 1984). However, in order to insure scoring accuracy the subject's protocols were all scored by Dr. Paul Torrance.

## RESULTS

The group mean scores on the Torrance Test of Creativity, Thinking Creatively with Pictures (Figural) were analyzed using a t-test. Group mean Figural Creativity Index Scores were

significantly higher for the learning disabled students than the normal population. Analysis of the subtest scores indicated that the learning disabled population scored significantly higher than

***** Insert Table 1 *****

the normals in the following areas: elaboration; resistance to premature closure; and mean bonus points. No significant group differences were found on fluency, originality and abstractness of title scores.

*****Insert Table 2 *****

DISCUSSION:

The results from this study indicate that the learning disabled college students performed significantly better than the normally achieving students on measures of figural creative problem solving. The learning disabled students obtained significantly higher scores on the Indicators of Creative Strengths (Bonus Points). Torrance (1984) has indicated that the number of creativity indicators is a better estimate of creative ability than the norm-referenced creativity index. The indicators of creative strength include the following items: emotional expressiveness; story telling articulateness; movement or action; expressiveness of titles; synthesis of incomplete figures; synthesis of lines and circles; unusual visualization;

internal visualization; extending or breaking boundaries; humor; richness of imagery; colorfulness of imagery; and fantasy (Torrance & Ball, 1984).

Results from the figural tests of creativity also indicated that the learning disabled students did significantly better than the normally achieving students on the divergent concept that Torrance labels 'resistance to premature closure'. This ability requires an individual to 'keep open' in processing visually presented information while integrating a variety of elements. In the past educators have often misinterpreted and criticized this ability to 'keep open' as lack of structure. However, a divergent thinker does not process information with the same organizational strategies as a convergent thinker. Flexibility of thinking allows a creative problem solver to recognize unique relationships among concepts and ideas. The "rigidity of thought patterns" that Cordoni (1980) attributes to the thinking processes of many learning disabled college students does not appear to be substantiated on all tasks (i.e., verbal and nonverbal). It may be that if learning disabled college students were assessed with more tasks requiring divergent thinking, they would not appear to experience difficulty changing perspectives based on the addition of new information.

The learning disabled college students also demonstrated a superiority in elaborating on their visual ideas. This concept

requires the ability to develop, embroider, embellish and carry out visual images (Torrance & Ball, 1984). High elaboration scores have been found to correlate with school achievement, especially teacher grades (Torrance, 1979). In creative problem solving, however, high elaboration scores are earned at the expense of fluency, flexibility and originality scores. Impulsivity and attention deficits did not appear to be interfering with the effective divergent problem solving of the sampled population.

No significant differences were found between the two groups on the scores for fluency, originality, and abstractness of titles on the figural creativity tasks. As mentioned previously, the fluency and originality scores may have been negatively affected by the energy the students spent on elaborating their figures.

The results of this study indicate the need to include assessments of divergent thinking and creative problem solving in diagnostic assessments of college learning disabled students. Researchers will need to investigate other tools that might be used to assess potential strengths not previously examined in traditional psychoeducational assessments. The study also has implications to the teaching strategies utilized with the learning disabled college students. Educators must be cautious

not to try to impose convergent learning strategies on students whose preferences lie in the area of divergent problem solving. Future research in the field of learning disabilities needs to investigate the efficacy of utilizing divergent processes to help circumvent cognitive processing deficits.

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## AUTHORS

Noel Cregg, Ph.D. and Cheri Hoy, Ph.D. are associate professors at the University of Georgia in the Department of Special Education. The authors contributed equally to this paper.

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Table 1

Comparison Between LD and Normal College Students on Mean Figural Creativity Index

| Group | M | SD | Range | T |
|---|---|---|---|---|
| LD | 124.88 | 14.82 | 107-163 | |
| | | | | 4.19* |
| Normal | 107.40 | 14.64 | 74-126 | |

*p<.01

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Table 2

Comparison Between LD and Normal College Students on Mean Figural Elaboration Standard Scores

| Group | M | SD | Range | T |
|---|---|---|---|---|
| LD | 117.92 | 22.69 | 79-149 | |
| | | | | 7.46* |
| Normal | 79.84 | 11.66 | 51-100 | |

*p<.01

Table 3

Comparison Between LD and Normal College Students on Mean Figural Resistance to Premature Closure Standard Scores

| Group | M | SD | Range | T |
|---|---|---|---|---|
| LD | 109.40 | 15.83 | 80-135 | |
| | | | | 4.39* |
| Normal | 88.60 | 17.79 | 60-115 | |

*p<.01



Table 4

Comparison Between LD and Normal College Students on Mean Figural Creativity Bonus Points

| Group | M | SD | Range | T |
|---|---|---|---|---|
| LD | 14.48 | 4.85 | 5-22 | |
| | | | | 4.63* |
| Normal | 9.36 | 2.64 | 3-14 | |

*p<.01